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The invention relates to a method for producing regular nanometer structures on semiconductor surfaces, especially regular pyramid and wave structures, which comprise a narrow size distribution and dimensions ranging from 2 to 100 nm, especially 10-60 nm, particularly in diameter or width and height. The invention is characterized in that a semiconductor material is used which is comprised of at least two and preferably two components thus forming a compound semiconductor. In addition, optionally neutralized noble gas ions from an ion source comprising an energy ranging from 10 to 50000 eV, especially 50-2000 eV, are directed onto said compound semiconductor material, with which, under a vacuum and by means of ion sputtering, the surface of the material is removed until the nanometer structure is produced.

